Heritage Packaging

Custom Protective Package Manufacturing

35 USC 112, Specification

Re: Non-Provisional Application for Utility Patent

TITLE:

Multi-Layered, Laminated, High Barrier, Corrosion Inhibiting Flexible Packaging Material

This specification is now being filed (during the pendency) of the earlier filed Provisional Application having a filing date of 02/12/2003 and which was assigned Application Number 60/446,572, Confirmation No. 3860 and Filing Receipt #OC000000009694186. It is the intent of the inventors to take benefit from said earlier filing.

FIELD OF THE INVENTION:

This invention relates to the protection of metal items from the ill effects of corrosion and more particularly to a flexible packaging material that is a composite made up from several different flexible materials which are arranged in layers; each possessing particular properties that collectively meet the goal of anti-corrosion protection, provided solely by a flexible packaging material, that will provide said protection for extended periods of time.

BACKGROUND OF THE INVENTION:

Previously, products or assets made entirely of metal, or having component parts made from metal have been protected from corrosion through the use of many different methods and / or compounds. Traditional methodologies include the "oiling" of all metal parts, application of grease to metal parts, saturation of parts with corrosion preventative sprays, manual wrapping of parts with corrosion inhibitor impregnated papers, packing parts inside a vapor barrier bag with moisture absorbing desiccants enclosed within and packaging parts inside mono-layered olefin based corrosion inhibiting films. Said methods have achieved limited success due to their dependency upon "operator application

Heritage Packaging
Custom Protective Package Manufacturing

Memo

400 Mason Road Fairport, New York 14450 Phone (585) 223-1336 Fax (585) 223-1365
Email: sales@heritagepackaging.com Web Address: www.heritagepackaging .com

---

To: Whom it may concern
Company: USPTO
From: Bill Smith
Date: 2/10/04

This application for patent is being submitted without the inclusion at this time of the "Oath of Applicant". The reason is that one of the three inventors was out of the country at the time of application preparation. We will submitt the Oaths upon his return together with the appropriate surcharge.

consistency" and exposure of packaged items to extreme corrosive environments for extended periods. Additionally; the oils and greases etc. would require an expenditure on subsequent cleaning labor prior to utilization of the product being protected and the methods that do utilize VCIs (volatile corrosion inhibitors) are only effective for short periods of time (less than three months) before the effectiveness of the VCI chemistry has migrated out of the carrier material and dissipated into the atmosphere. This invention demonstrates substantial improvement of corrosion protection techniques through the combination of an effective corrosion inhibiting mono-layered film with a moisture and gas barrier providing foil layer, together with additional "outer-skin" layers of other flexible films that provide tear, abrasion and puncture resistance to the overall composite material. When a metal item is enveloped within a package made from this invention it will be protected for substantially longer periods of time (numerous years) because the VCI chemistry is trapped inside the package as well. The barrier foil layer prevents the corrosion inhibiting molecules from escaping while at the same time preventing any new moisture or corrosive gasses from entering the pack.

SUMMARY OF THE INVENTION:

This invention is a high performance laminated composite structure for use in the protection of both ferrous and non-ferrous metals from damage caused by corrosion, rust or oxidation. The material is manufactured through the utilization of either extrusion, solvent or adhesive lamination processes. After lamination, the material is re-wound onto a core as "Single Wound Sheeting" from which it may be further processed into converted items such as heat sealed bags, covers, liners, continuous tubing, pouches, edge-sealed V-sheeting, die-cut shapes etc. The net result of the utilization of this invention is that the end user will benefit from long-term protection against corrosion and no need for the cleaning of parts prior to their use. The combined barrier and anti-corrosion properties are intended to render the laminated composite structure useful as a flexible packaging material used to protect products during transportation and /or long term storage and preservation.

DETAILED DESCRIPTION:

The composite structure is comprised of (an) outer layer(s) of flexible film(s) (such as Polyester, Nylon, TYVEK®, Valeron® Film or Polypropylene etc.). The outer layer(s) provide puncture, abrasion and tear resistance and they enhance the overall strength and barrier capacity of the composite material. A "tie layer" (i.e. polyethylene extrudate, adhesive or solvent); bonds the outer layer(s) (to each other if applicable) and to a **Barrier Layer** which is an **aluminum foil** (which is a major improvement over olefin based barrier layers of other structures). The foil layer minimizes the transmission of water vapor, oxygen and other gasses, through the material. This block or barrier works in both directions; thereby keeping desired elements in and un-desired elements out of a package

or cover made from the material. Another "tie layer" is used to bond the inner sealant layer to the foil. The inner layer is a LDPE film identified as Cortec VpCI-126 (or its equivalent) The VpCI-126 is a vapor phase corrosion inhibiting film. See Figure 1 for a graphic depiction of the manner in which the different layers of the composite are assembled.

The volatile corrosion inhibiting chemistry contained within the "sealant layer," migrates out of the film, on a molecular basis, into the interior atmosphere of the package and surrounds the metal parts enclosed. The VpCI molecules make their way to all metals within a given enclosure and form a microscopic film on the surface of the metal. This film prevents any moisture or corrosive gas that may be present from contacting the metal; thereby preventing corrosion from occurring. The barrier layer (foil) prevents the gaseous vapor phase corrosion inhibiting molecules from escaping from the package thereby trapping the protective chemistry within (See Figure 2). This entrapment of the VCI chemistry or corrosion inhibiting elements, remains in an un-diminished, full strength condition indefinitely.

The flexibility of all layers of the composite material and the absolute barrier properties provided by the foil layer are what enable the material to maintain a vacuum. It is the combined strength and suppleness of the inner and outer layers that prevent the foil layer from being compromised during the "draw-down" phase of vacuum packaging. The significance of this feature of the invention is great. The complete elimination of any atmosphere from within a package or larger enclosure, such as a three dimensional cover for a large piece of equipment, results in the elimination of any corrosion causing elements from that same environment. After evacuation of the inner atmosphere takes place, the VCI chemistry is still contained within the sealant layer film and will migrate out of that layer and coat the metal parts within the package. In the event of a package under a vacuum condition being punctured during shipment or storage, the VCI coating remains present and at work preventing corrosion from occurring.

OUR CLAIM:

This multi-layered laminated structure is the first and only flexible packaging material that combines substratum (comprised of one or more strength providing outer layers affixed to an **aluminum foil barrier layer**), with a vapor phase corrosion inhibiting film used as a sealant layer, to yield a composite material that can be heat-sealed to form an air-tight enclosure around any given metallic asset and that can maintain a vacuum after the atmosphere within the enclosure has been evacuated. The end result of this combination of flexible materials is a composite, that when heat-sealed, around an item, and without any previous "conditioning" done to the metal, will prevent the occurrence of corrosion on that item.